Rocky Intertidal and Nearshore Habitats

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♦ *Priority Issues*:
   • Inadequate baseline characterization of representative habitats
   • Changes in abundance (adults and recruits), distribution and condition of target taxa and biodiversity
   • Human-induced impacts on human and marine organism health and ecosystem structure and function due to: pathogens, pollutants, parasites, introduced species, habitat loss and alteration, exploitation, disturbance, trampling, rock rolling, drop anchors
   • Natural impacts on human and marine organism health, ecosystem structure and function due to: a.) species interaction b.) changes in physical/chemical /geological environment c.) a and b interactions (not measured, an analysis activity)

♦ *Characterization of Priority Questions*:

Where are species located geographically within the rocky habitat?
Parameters - All species 0.5 cm or larger or very common/abundant species if smaller
Methods - Visual search in a delineated area, rank relative abundance
Spatial Scale - Intertidal to 50m depth, representative sites throughout the entire length of the Sanctuary
Temporal Scale - Ongoing, indefinitely
Frequency - Decadal
Existing Data/Programs - Some intertidal, less shallow subtidal (0-30m), much less deep subtidal
Additional Comments - How will data be handled, quality control and archiving issues must be resolved, species lists and qualitative assessments of abundance are needed, include sample sites within and outside of reserves (full reserves include subtidal Big Creek, Hopkins, Pt. Lobos)

What are the temporal, spatial and geographic patterns of target taxa in rocky *subtidal* habitats?

How do spatial and temporal patterns of *subtidal* target taxa differ within and outside of marine protected areas?

What are the temporal, spatial and geographic patterns of target taxa in rocky *intertidal* habitats?

How do spatial and temporal patterns of *intertidal* target taxa differ within and outside of marine protected areas?

* The four questions above can be characterized similarly by using patterns of target taxa in the subtidal and intertidal, as well as in and out of marine reserves
Parameters - Abundance, size distribution (for select species), condition (for select species) and distribution within site, habitat association, recruitment, species list should come from initial survey in the first question
Methods - Standard methods appropriate to target taxa and depth (in situ with humans); Quantitative surveys, fixed and random surveys, stratified random; Aerial surveys for intertidal
Spatial Scale - Subset of sites surveyed in first question covering the length of Sanctuary, sites within and outside of reserves
Temporal Scale - Ongoing, indefinitely
Frequency - Annual, timing very important, but appropriate window for sampling is important, possibly time chosen to coincide with organism
Existing Data/Programs - More for invertebrates and algae but less for fish in the intertidal, less for invertebrates and algae but more for fish in the shallow subtidal (0-30m), little for fish, least for algae in deep subtidal (30-50)
Additional Comments - Collect and sample at spatial and temporal resolution correlated to changes in physical parameters

What are the select pathogen, pollutant and parasite (ppp) loads in sea otters and harbor seals (live and dead), shellfish and birds?
Parameters - Yearly mortality and causes of death, beach cast and population counts based on answers of questions below, selected ppp in living and dead organisms (otters, seals, birds, shellfish)
Methods - Standard analytical methods for live and dead
Spatial - Length of the Sanctuary for seals, otters focus on species Pt. Conception to Half Moon Bay, birds within entire Sanctuary, for mussels need higher resolution than is currently provided by NOAA program
Temporal Scale - Ongoing, indefinitely
Frequency - Otters and harbor seals (dead) as opportunity arises (sampling permit required from FWS and MM department for live sampling), for every rehabilitated animal to the extent possible, opportunistic as research programs allow; shellfish should be tied in to the existing State Health Department and NOAA Mussel Watch programs; birds opportunistically

Existing Data/Programs - A lot of information on sea otters and harbor seals, much less on seabirds, a lot of specific contaminants information for shellfish, some on black abalone's parasite withering syndrome

What are the impacts of direct exploitation - e.g., fishing?
Parameters - Species specific and location specific total catch and CPUE for target species and bycatch
Methods - Subtidal fish and invertebrates using direct onboard observation, shore-based creel surveys, total commercial and recreational landings; Intertidal using comparative information for species collected, bycatch, otters, birds, mammals; Kelp by monitoring harvesting
Spatial Scale - Throughout the Sanctuary at fishing ports and launch ramps (creel surveys), onboard boat surveys throughout Sanctuary
Temporal Scale - Ongoing, indefinitely
Frequency - Opportunistic depending on availability of fishing effort (for recreation and commercial)
Existing Data/Programs - A lot of data except for intertidal harvest of invertebrates and algae, none for scientific collection
Additional Comments - Reinvestigate the scientific collection system and analyze existing data

What are the impacts of non-consumptive disturbances (e.g., trampling) on intertidal and subtidal habitats?
Parameters - Human activity (e.g., kayakers, beach goers, divers, surfers, shell collectors, boating activity), species abundance, distributions and conditions and behavior of species, habitat changes
Methods - Methods for organisms and habitats as per questions above, census of human activities
Spatial Scale - Stratify sampling sites areas of high and low human activity, human vs. no human among sites, paired comparisons (e.g., Terrace Pt and Natural Bridges)
Temporal Scale - Ongoing
Frequency - Counts of humans as often as possible, number of people through park records (weekly to monthly) but more frequency where records exist, organisms annually
Existing Data/Programs - Very little human census, effects of trampling on intertidal organisms is spotty; subtidal data is low and boats/diving impact info is low

What are the impacts of changes in activity, abundance and distribution of apex predators (e.g., sea otters and harbor seals)?
* Can be answered analytically based on results from above questions

What are the spatial and temporal changes in temperature, storm activity, nutrients, upwelling, light transmission, current patterns, sea levels, river input (freshwater), cloud cover/fog?
Parameters - Temperature, storm activity (wave height and period), nearshore nutrients, light transmission (variable), wind speed and direction, salinity, surge, visibility, currents, sea levels, river input, cloud cover/fog, erosion (cliff retreats)
Methods - There are really no standard methodologies for nearshore, prioritization to be determined
Spatial Scale - Link to monitoring sites

Temporal Scale - Ongoing

Frequency - Determined by instrument, to be determined and linked to biology

Existing Data/Programs - Temperature data exists (mostly surface), other parameters two ongoing programs USGS and PISCO